

Liang
/ H. B. Whitell

1913-1935

BOTANICAL PART OF A DIARY KEPT WHEN ON TOUR

BY I. H. BURKILL from 1913 to 1925.

June 18th., 1913. Left Singapore by the S.S. "Lama" at 4 p.m. and arrived at Port Swettenham early on the next morning.

June 19th. Visited forest at $1\frac{1}{2}$ miles along a road branching from the Klang road. Casuarinas are planted in the centre of the town and have reached about 70 feet. Along the Klang road Erythrinas have been planted. They lean away from the road in a most marked way. This leaning seems to have been caused by the slipping of the roots in the wet soil; and the trees disappointed those who planted them by branching low and the branches towards the road had to be cut off. Thereby the balance was upset, so that the trees inclined away from the road. Towards the Port Swettenham end of the road many of these trees have died as if the ground was too wet or too saline for them; and at this end I noticed that the leaves are twisted so as to get their edges towards the light.

Nipa is plentiful near the town and is generally in fruit, but flowers also were seen. The male flowers were seen busily visited by Melipona bees.

From the edge of the forest the larger trees have been removed; and it appears as if the disturbance so caused has led to the death of the larger individuals of the palm *Oncosperma*. *Livistonas* show injury, but survive. *Oncosperma* seems to die down to the root; and the bottom of the forest is full of their dead stems.

A composite is very common upon the more saline lands, growing in beds 6-8 ft. high without any intermixture.

Cultivation is chiefly of coconuts. Next of Nipa. At a little distance there is sugar cane, sweet potatoes, chinese cabbage and lettuce. Someone in Port Swettenham grows Hibiscus

on little mounds.

Lettuce is flowering and many individuals of *Apis dorsata* are at its flowers.

Eclipta is plentiful upon roadsides. *Jussiaea* was seen in flower.

June 20th. arrived in Penang at 8 a.m., and went to the Waterfall gardens. The heavy rich green foliage of *Pterocarpus indicus*, the *angsana*, is most noticeable in Penang. In the Gardens *Cassia javanica* and *Cassia fistula* are making a fine show. Of pot-plants flowering are orange *Cosmos*, *Impatiens balsamina*, *Amarants* and *Petunias*. White and magenta waterlilies are flowering freely. A number of orchids are in flower. A species of *Eurya* is flowering most abundantly and so is *Grewia paniculata*. There is a great abundance of *Dioscorea laurifolia* springing up everywhere near the jungle.

June 21st. In the morning to the Gardens and in the afternoon to Mount Erskine on its west side. The soil looks poor but seems to suit the orchards of rambutans and other fruits. Grasses are plentiful and the chinese grave-yard is covered by them almost to the exclusion of anything else. *Passiflora foetida*; *Lantana Camara* and *Stachytarpheta* are plentiful. *Melastoma malabathricum* is present, but not in large quantity. *Grewia paniculata* is abundant.

There are no signs of coconut beetles in the coconut palms; but the foliage is commonly damaged.

June 22nd. To the Waterfall. There is a statement in one of the old Gardens reports to the effect that jungle was at that time displacing lallang at the head of the Gardens. That would refer to jungle near the Waterfall which appears as if about 30 years old. Cavanagh in his *Reminiscences*, p. 279 states that excessive removal of timber had taken place from the Penang hillsides; but that woodmen were not allowed above a certain level. Curtis in his *Flora of Penang* remarks

upon the absence of Dipterocarps from the ~~the~~ lallangp covered areas.

There is a Globba (no. 368) common near the Waterfall and newly in flower. Daemonorhops Lewisianus is plentiful. An Antodesma is common.

June 23rd. To the Gardens in the morning and to the Residency in the afternoon. At the Residency I saw a caterpillar which sews two leaves of Cassia fistula together, and eats away the surface or the whole thickness. It is half an inch long and green. Not uncommonly it rest on the midrib exposed, but protected by its resemblance to it.

This is the flowering season of Cassia fistula and C. javanica.

June 24th. To the Gardens.

June 25th. To the Gardens in the morning and to Ayer Itam in the afternoon. Utricularia racemosa and U. bifida were found in the same bog.

June 26th. To the Gardens. An Elaeocarpus is in flower in the adjoining forest.

June 27th. To the Gardens.

June 28th. Up the Government hill road, after a very wet night. There is little in flower in the forest; moreover nowhere did I find the ground strewn ~~XXXXXX~~ with fallen ~~XXXXXX~~ flowers. Melastoma decemfidum, Pternandra capitellata and Sonerila moluccana were out representing the Melastomads. Didissandra frutescens and Didymocarpus crinita represent the Gesnerads, but the latter is not in flower. Staurogyne racemosa was found flowering in a single individual. Viburnum sambucinum was in flower in a single bush, Randia anisophylla in a single tree, Psychotria sarmentosa in a single plant: also one plant of the green flowered Wikstroemia was seen in

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flower. *Rhodomyrtus* was in flower not uncommonly all the way. Its stamens bend upwards from their very bases, and sometimes if not always cause a slight bilateral symmetry in the flower.

A Globba (no. 368) was seen sparingly in flower about half way up the hill. *Cassia mimosoides* was in flower near the top.

Insects appeared scarce, *Heliponas* were upon the flowers of *Helastoma decemfidum*. No butterflies were seen.

The gardening at the hill-top is disappointing; the soil is very poor and the cost of manuring it high. The Cape-gooseberry carried fruit s. *Cyphomandra betacea* has been procured and lost. *Sechium* was not seen. Peas are a foot high. Beans are moderate. It is complained that the monkeys steal papayas and gourds. Lettuce, mint, parsley and carrots looked fairly good. Native radishes and kohl-rabi were small. Flowering plants look as if with manure they would do well. But roses get weaker and weaker until the blossoms are almost single. Dahlias are ~~XXXXXX~~ only a foot high. *Impatiens Sultani* is doing splendidly and some Composites are good..

June 29th. & 30th. To the Gardens. An *Elaeocarpus* which was in flower a few days ago, seems to have flowered itself out. This is not the case with *Cassia fistula* and *Cassia javanica*, whose flowering apparently lasts longer. *Bauhinia unifolia* is flowering in the jungle above the Gardens and exhibits a longer flowering period

July 1st. Penang to Kuala Kangsar. This is an account of the Government fruit and rubber plantation as shown to me by Mr. Edwin Phillips. Near the cross roads towards the river are old trees of *Hevea*, the largest of which have fallen. These trees are upon a slope above the river within reach of extreme floods, but not normally reached by flood-water.

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The whole of their lower surface has been tapped, and of some of them up to ¹⁵~~XX~~ ft. from the ground. Their age is 30 years and it is therefore interesting that they should be dying. Younger trees exist along with the 30 year old trees. The old trees carry fruit which will ripen during July (i.e. earlier than in Singapore); at the same time they are in flower. Mr. Phillips pointed out to me one tree which he said never produces filled seeds; but it yields plenty of latex.

Other trees seen are *Funtumia elastica*, *Castilloa elastica*, Oranges, Pomeloes, Mangosteen, Nutmegs and Chikus. There exists in Malacca (says Mr. Phillips) a chiku as big as a goose's egg which he wishes but cannot get to cultivate.

Mangos are poor in Kuala Kangsar. Teak grows well on the roadsides and is fruiting. Cacao does satisfactorily.

It rained lightly in the evening; and at this season generally rains every evening.

July 2nd. In the morning down to the Istana. There are few plants in flower now. *Mimosa pudica*, *Gymnopetalum integrifolium*, *Eclipta alba*, *Blumea*, *Uraria lagopoides*, *Lantana Camara*, *Euphorbia hypericifolia* and *Euphorbia* ^{*hirta*} ~~XXXXXX~~, a *Clerodendron*, grasses and sedges are the only plants at all commonly in flower. *Hedyotis connata* was found in flower in one place. *Cocos nucifera* and the rubber tree are freely in flower.

At noon we left for Singapore, noting the abundance of *Tridax* at Kota Bharu on the line side along with *Paspalum scrobiculatum*. *Nelumbium* was seen in flower in several places.

July 3rd. Back in Singapore.

A VISIT to the KUKOB DISTRICT. August 10th. 1913. Singapore was left at 2.00 a.m. by launch and the Sungei Pulai reached and then the Sungei Peradin entered, and so the Pineiro estate reached. I was in company with Overbeck and Diehn of the firm of Behn Meyer and Co.

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of A. Mackenzie of the Pulau Bulang rubber estate, and was met by Petre of Ayer Massing and Ducane the estate's manager. We went round the estate, just touching jungle and leaving at 3.45 p.m., were back in Singapore late on the same evening.

The state is on lowlying peat, about ten feet above high tide. This peat has been boree and found to be ~~XX~~ 12-20 feet thick. It seems to have been made entirely by the decay of timber, the rotting of which is interesting; the soil is patchy according to the stage of decay reached by the last rotted log which has fallen to the ground. The water runs off the land with some difficulty in various directions and is a deep brown. Sisal hemp and *Furcraea* have been planted, and the *Furcraea* cut out recently. The chief weeds are ferns, very largely *Nephrolepis*. *Fimbristylis pauciflora* is common both in the ditches and upon the surface of the ground. *Physalis* is a common weed. *Solanum nigrum* is not very abundant, but a weed. A coarse pale yellow Composite is, not uncommon.

It is very easy to draw plants out of the soft peat and for the same reason the rubber trees interplanted among the sisal easily blow over.

The bulbils of sisal in seed beds have grown in an interesting way: they will stand a patch of strong dark green plantlets beside a patch of pale poor plantlets making no growth, according to the state of the peaty surface, which is most uneven in composition, and possibly best where logs have been burned.

Passiflora foetida is common. A *Callicarpa* is common. The secondary scrub by the factory is made up of *Uncaria* and an allied Rubiaceae, together with *Callicarpa*, *Lantana*, *Trema*. At the edge of the forest is *Cyrtostachys* *Lakka*.

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Along the creek below the landing stage, Carapa is evident along with mangroves. Grammatophyllum is growing in them. No. 118 is a common shrub upon the peat.

A TOUR of
INSPECTION to
PENANG.

December, 8th., 1913. left Singapore by the night train, and on the evening of December 19th. reached Penang. There is newly planted rice and half-grown rice to be seen between Kuala Lumpur and Prai. Colocasias seem newly planted. At Bukit Mertajam there are five fields of Sagittaria. Bauhinia (doubtless *B. flammifera*) was seen in flower near Tanjong Malim.

December 10th. Twice to the Waterfall Gardens. Cassia javanica is covered with long pods nearly ripe from the flowers seen upon the last visit. There are several nice orchids in flower and Decaschista pulchra which Md. Haniff has procured from Setol. The trees of Polyalthia longifolia are unsatisfactory. Coconut planting is taking place, new trees among the old in the plantation of the island.

December 11th. With Mr. Bos to the Lunas estate upon the Kedah border. After leaving Butterworth the road at a few miles crosses the Prai river at a place where there is much Nipa cultivation now with ripe fruit. In the extensive rice fields a yellow Utricularia is conspicuously in flower. The ravages of Oryctes and of Brachartona upon the Coconuts at Malang Napauk are too evident.

The road continues among rice fields with groves of coconuts and then climbs a bit and runs among coconuts with only a little rubber and no jungle until it reaches the frontier of Province Wellesley. In the 300 yards belt, which marks the frontier I collected Dioscorea pyrrofolia, and Hedyotis capitellata. The belt is covered by six-foot high bushes, with lallang. All the timber has been removed.

Bamber has analysed the soil of the Lunas estate which is at this point and he reports 70 per cent of sand. It is homogeneous to at least three feet. The estate was in tapioca interplanted with coconuts, and the coconuts died badly, possibly because the water was not held sufficiently for them. Ballang seems to have followed the tapioca.

December 12th. To the Waterfall Gardens, and in their neighbourhood. Flowers are very scarce under the trees. *Didymocarpus reptans* was found at the site of Curtis' bungalow, and was the only plant in flower. *Rhodomyrtus* and a *Zizyphus* were found in flower upon the lowest part of the hill road, but there were no herbs in flower with them. In open places herbs are in flower such as grasses, a *Xyris*, a *Pesmodium*; but nothing conspicuous is in flower.

On the *Hevea* trees in the Gardens a black *Melipona* was collecting latex in large numbers. Md. Haniff says that this bee is a great flower visitor and that the races of fruit trees are crossed by it, so that they rarely come true. He says that it is a great visitor to the flowers of the coconut palm.

In the Gardens *Bignonia magnifica* is flowering splendidly. *Allamanda violacea* and *A. Schottii* are flowering well. There is a *Stillingia* flowering freely with strongly smelling green flowers.

Butterflies are not numerous.

Jacaranda mimosaeifolia is flowering well.

Psophocarpus is on sale in the stalls here; and its blue flowers have been seen in a garden twining with *Dolichos Lablab*.

December 13th. To the Gardens, where tubers of *Dioscorea glabra* ~~XXXXXX~~ were dug. Thorns do not develop on the stems in its first year of growth.

In the afternoon I left for Singapore.

December 14th. at Port Swettenham, whence I took the train to Kuala Lumpur, where I examined Agaves with Lewton-Brain. He has a lot of a *Eurcraea* which is no. 406 of the Gardens Field books, a patch of no. 405, and a little of 404. The no. 406 is producing thousands of bulbils. No. 405 is producing flowers amid bulbils. Its stem carries leaves not in a rosette, but in a club. No. 404 has very rigid leaves. None small of rhubarb.

He has a rather small tree of *Dryobalanops* in fruit. *Cinnamomum Camphora* after two cuttings is going to flush.

I returned in the afternoon to Port Swettenham, where before sundown all the flowers of *Ipomoea pes-caprae* had closed.

Hibiscus cannabinus was seen in cultivation near Batu Tiga; but insects had defoliated it.

December 15th. in Singapore again.

A VISIT to the KUKOB district. January 24th. left Singapore in rain in the early morning with Overbeck^{and}, Diehn, A. Mackenzie; and arrived at Hevea estate in the afternoon. Thenceforward it rained very heavily. On the Hevea estate the peat ends; which peat it had been seen attains a depth of 20 feet on the Pineiro estate at the landing stage, and I have a note that it attains 90 feet elsewhere on the same estate. Under the peat upon the southern part of Hevea estate is a soft blue clay. Where the peat ends on the northern part the clay is white or yellowish, but not the yellow of the clay of Singapore. Laterite is found in the very north of this estate. The Hevea estate was planted up in 1906 and the Pineiro estate in 1908; upon both the shrinking of the exposed peat has left the rubber trees standing on stilts

I went through the estate in rain, seeing some tobacco which had attained six feet in height.

In some belukar a few shrubs, are in flower, - e.g. a white-flowered Myrtacea, and Pavetta ijdica. Grammatophyllum is in flower among the mangroves.

Fomes semitostus was sparingly seen. A pink Fomes was commoner upon decaying logs.

Alexander Mackenzie thinks that Koompassia wood decays very fast when in contact with the ground.

The weeds on the state are interesting. There is the Fimbristylis which is common upon peat, and a Paspalum. Spermacoce is common, in fact the lawn of Murdo Mackenzie's bungalow (the manager's bungalow) is made of it.

Lallang appears in patches especially upon the clay. Mussaenda, a Vitis, a Deliotrogium, Costus spiralis, and a Vernonia were noticed.

January 25th. The Hevea estate was left by launch at 8 a.m. for the Pineiro estate; and while it rained at intervals we went round the rail-track, the rest of the land being under water.

Two sisal diseases appear, one kills circular patches of leaf tissue, and the other causes a red colouration on the white bases of young leaves.

Passiflora foetida is abundant upon both estates.

Nephrolepis is extremely common making sheets in places. Pteridium aquilinum is common also. A Lauracea is plentifully in flower. A little Commelyna is in flower upon the peat. Conocephalus was seen in plenty.

I do not recollect seeing Melastoma malabathricum.

In the belukar a Macaranga is common. Callicarpa is with Plectocomia, and lallang in places. The last named seems quite at home upon the peat.

AN ECONOMIC TOUR
in MALACCA and to
PENANG.

February 9th., 1914. Left Singapore for
Malacca by the SS. Kaka.

February 10th. The captain of the Kaka says that
for every 800 durian fruits that in season he picks up
at Malacca, he picks up 3000 at Muar; which shows how much
more this fruit tree is grown in Muar than in Malacca..

Malacca is dry and dusty; the rice is being cut.
Dioscorea alata, - Ubi, merah, - about 1½ feet long is on
sale in the shops of the town, Chinese shops in all
cases. *Pachyrrhizis* is freely offered, but *Alocasia macro-*
rhiza sparingly. Chinese cabbage tops were being brought
into the town for sale as a fresh vegetable. Brinjals
were freely on sale, and lettuces were on sale also.
And so also *Parkia* pods

There is a chinese herbalist who offers a number
of fresh herbs including *Hydrocotyle asiatica*, and *Eclipta*
alba.

In the evening I went to Tanjong Kling, where the
coconuts are not adequately cared for, and where rhinocer-
os beetle larvae were found in logs in damp positions:
but the weather is apparently too dry for these pests
to mature in logs in dry positions.

Vinca rosea, both red and white, is common; besides it
very little is in flower.

Pandanus is considerably cultivated near Tanjong
Kling; and *Nipa* is rather common and evidently much used.

Mango trees in Malacca are coming into flower but are
not common. *Erythrina* is flowering near the Stadthaus,
with fewer leaves on it than it carries in Singapore, but
at the same time, by no means bare. *Grammatophyllum* which
is now well in flower in Singapore is not flowering in
Malacca.

February 11th. By motor to Merlimau and to the Forest Reserve. Rice lands and village lands alternate until Merlimau is reached except that the road in one place touches rubber: from Merlimau to the Reserve it is all rubber except for a small patch of coconuts and a bit of jungle in a hollow.

The rice appears to be all of one variety, except for a very small admixture of no. 419. I observe that many of the plants are sterile. There is a little land lying fallow covered by sedges, and that close to Malacca town. The rice lands are backed by coconut groves, with a variety of fruit trees intermixed. These fruit trees are chiefly *Baccaureas*, mangosteens and *Nepheliums*. Durians are rare and so are oranges. Pomelos are more common. Mangos are rare. There is no fruit upon these trees at this season; and what one sees in the village shops is plantains and rarely durian blanda.

Pepper occurs in small patches, and also brinjals. Pineapples are isolated except where near Merlimau a small patch of rubber has been interplanted with them. *Alocasia macrorrhiza* was seen but once.

In ~~XXXXXX~~ villages Chinese cabbages and keladis are plentifully on sale.

No *Vinca rosea* was seen. *Turnera* was seen sparingly. *Chasalia curviflora* is plentiful under trees at Umbai. *Hibiscus surattensis* was seen once. *Ardisia crenata* is common. The very curious *Thottea grandiflora* was plentiful in one spot: it flowers close to the earth. Very few aroids carry flowers now.

Melaleuca leucadendron has been used as a roadside tree where the road crosses rice land. The trees lean out markedly away from the road.

Near Malacca I found *Viscum articulatum* growing on *Loranthus ferrugineus* parasitic upon *Eriodendron fructuosum*.

Nipa fruits are not ripe here, nor nearly so.

Durian blanda trees are badly attacked by a wooly aphid.

February 12th. By train to Alor Gajah, and with J.D. Hall to Pulau Sabang and Sempang Ampat.

Rice crops do not come up to the railway in most places. Hall says that water now escapes to the sea by the Malacca river in one quarter of the time that it used to take. This is a consequence of the clearings of the uplands. Nevertheless more rice has been sown in this year than in 1912. In 1911 there was a drought and a partial failure of the rice crops which left no seed-rice: moreover rinderpest in 1911 cleared off the plough-buffaloes. In the current year flooding had done damage.

Rice reaping is now in rapid progress.

About Alor Gajah there is an interesting form of scrub. The highest bush in it is generally *Peltophorum dasyrrhachis*; and *Morinda elliptica* is common in it, being the next in size. Smaller bushes are *Decaspermum paniculatum* and another (no 431). *Henslowia varians* is plentiful in it. Grass occurs between the bushes. The ground is now hard. The lallang does not make a part of this vegetation; but lallang lands are not far away.

February 13th. By Tanjong Kling and the Sungei Baharu forest to Pangkalan Balak, and on a few miles further; and on the return by the road which almost reaches Alor Gajah.

The Pernambuco cotton, the introduction of which is recorded in Jack's letters, was seen near Tanjong Kling.

Opuntia monacantha exists upon a house roof in Tranquemar.

The rice crops upon this side of Malacca appear very good. There is new planting of coconuts and of rubber just before the Sungei Baharu forest is reached. Between the

forest and Pangkalan Balak the road passes through village lands and crosses now and then paddy sawahs. Beyond Pangkalan Balak is rubber interplanted with gambier, and near Pangkalan Balak under rubber; and some very dirty tapioca under rubber. Towards Lendu there is an increase in the amount of tapioca, generally in acre patches.

In the Sungei Baharu forest no trees were conspicuously in flower; but quite a number of small trees were in flower with inconspicuous flowers. The soil seems lateritic. Palms are present only in hollows. *Oncosperma* was not observed. One large flower was found, that is *Randia macrophylla*.

Grewia microcos is just coming into flower. *Clerodendron disparifolium* was seen in flower. *Melastoma malabathricum* is in flower upon the roadsides. *Philydram* was seen in flower in a swamp.

February 14th. proceeded to Jasin. After the first seven miles the road is almost entirely through rubber. but near Jasin a little tapioca occurs mixed with rubber and one patch of gambier under rubber. About nine miles from Malacca there are some mangosteen trees mixed with rubber, and full of *Loranthus*.

In the evening *Xylocopa aestuans* was observed upon the flowers of *Crotalaria striata*.

Pesamum was observed to grow well by a hut from which apparently the seed had been thrown

February 15th. *Passiflora quadrangularis* was seen in fruit. *Turnera* exists near Jasin, the white one, and two individuals of *Xylocopa aestuans* were sucking honey upon its flowers, both when we passed the spot going out and when we passed it in returning, - therefore persistently.

Rice no 454 seems to be a race which likes more water than the others.

In the evening I went to a granite quarry upon the north of Jasin, through part of the Kemendor estate. *Dioscorea pyrifolia* was common in the hollow upon the way carrying ~~XXXXX~~ fruits half-ripe as well as male flowers. There are a few palms in this hollow, but small; and there is *Plectocomia*. The only plants of *Oncosperma* seen so far are upon the west side of Jasin.

The weeds in the rice fields are all monocotyledonous except a little *Utricularia*.

A *Massa* was seen in flower and plenty of *Blumea balsamifera*.

February 15th. *Coffea* is in the gardens of Jasin and is attacked by *Hemileia*. Pepper is very sparingly grown.

February 16th. We returned from Jasin to Malacca, via Kesang and Durian Tunggal. Almost to Kesang the road goes through village lands of the usual type; then for a little through forest, and at its edge old mining which is described in Cavanagh's *Reminiscences* p. 276: from the 17th mile forward we went for some distance through country covered by lallang and in the lallang a sprinkling of small trees, - *Vitex peduncularis* and the like.

South-west of "aring estate there is a fair amount of tapioca, and a few pineapples were seen planted under rubber, near Batu Perendam.

At Batu Perendam an *Opuntia* apparently *O. cochinelifera* was seen in a garden, an old plant about seven feet high.

In Jasin in the morning I had seen *Xylocopa latipes* biting through the tubes of the flowers of *Jacaranda mimosaefolia*.

February 18th. Proceeded from Malacca to Kuala Lumpur. *Calanthe plicata* and a *Bromheadia* were observed in flower near Seremban. *Dioscorea pyrifolia* is common near the office

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of the Director of Agriculture.

H.C. Pratt states that an ichneumon kills Brachartona in the neighbourhood of Kuala Lumpur.

The weather is unsettled.

February 19th. From Kuala Lumpur to Penang..

Bauhinia flammifera was observed at Tanjong Malim in ~~XXXXXX~~. flower. *Mimosa pudica* was observed as forming a bank of flower near Kuala Kubu with *Stachytarpheta* and *Thunbergia alata*: but on the whole flowers are ~~are~~ not conspicuous. There has been no rain in Penang for a week, and what there fell was little.

February 20th. To the Gardens, etc.

February 21st. By Bayan Lepas to the Ginting ~~XXXXXX~~ pass. The rice crops of Glugor look well. The village of Bayan Lepas is full of young mangosteen trees. The composite *Elephantopus tomentosus* is common there under coconut palms. It is difficult to find any young clove trees.

There are very few flowers out at present. ~~XXXXXXXX~~ *Wikstroemia viridiflora*, a Myrtacea, *Elephantopus tomentosus*, which is at its last flowers, an *Eriocaulon* and a *Malotus* were observed. One flower of the orchid 467 was seen.

Dioscorea hispida was seen at Bayan Lepas putting out new shoots, the old having disappeared, so that it has assuredly been resting.

February 22nd. To the Waterfall Gardens, close to which it was observed that *Ficus elastica* carries a number of Loranth. It and *Eriodendron* seem to carry most.

February 23rd. To Nibong Tebal. The coconuts towards Prai are new plantings: old coconuts are not met with until Bukit Mertajam is approached. Just before Bukit Mertajam is reached there is an increased amount of *Sagittaria*. South of Bukit Mertajam there is a wide stretch of pineapples and a considerable quantity of tapioca. Nipa occurs in plenty at Sempang Ampat; and nearby are old coconuts in plenty and a little coffee, but the last only in a garden..

From Nibong Tebal station I walked through the village to the road to the Ibal ferry.

There is quite a lot of fruit on sale, - plantains of several kinds, pineapples, rambutans, pomeloes, mangosteens cabbage, betle-pepper leaves, white brinjal, ladies' fingers, (in quantity), gourds, *Capsicum minimum* and *Colocasia*.

Beyond the village, the road is lined by Nipa palms in one side. Then very young coconuts are reached, among which chinese squatters are growing vegetables as *Momordica Charantia*, *Luffa acutangula*, *Vigna Catiang*, the first two at present being very young. Upon the other side of the station similar cultivation exists to which is added the white brinjal.

Rain came up at night.

February 24th. To Batu Feringhi. *Dioscorea glabra* was found. This plant is smaller in fruit than the *Dioscorea pyriformis* which is found in Singapore, and in Kuala Lumpur

Chelone is common at Batu Feringhi; and a *Tabernaemontana* was flowering with white upright flowers. *Rhodomyrtus* and *Melastoma malabathricum* are in flower sparingly. Of weeds *Amaranthus spinosus*, a *Sida*, *Urena lobata* and *Mimosa pudica* are in flower about Georgetown.

Zizyphus Jujuba was seen.

February 25th. To Bukit Mertajam, and with R. Scott to Sempang Ampat, the Juru estate, and then back to Penang.

Nutmegs are said to have gone out upon Bukit Mertajam. The Areca cultivation remains. There are in the town those who buy and dry areca nuts. Upon slightly ridged ground matting is spread, and the halved nuts are spread over the matting, walking ways being left along the hollows. With a heavy bit of wood on a handle the nuts are raked over by women.

Of catch crops under ~~XXXXXX~~ young coconuts, pine-apples seem to come next in importance after tapioca.

The squatter system is deeply rooted in the Province. Vegetable growing is within a squatter's competence.

Fruit in the Province upon estates is just relics of planting round former country houses, and is gradually going out.

The area of Sagittaria near Bukit Mertajam increases; the Chinaman who owns it and raises pigs takes three crops a year and pays a large rent. He has diverted the village drainage into his fields. One crop of Sagittaria immediately succeeds another.

February 26th. Swietenia mahogani, has flowered in the Waterfall gardens this year for the first time: but in the town it has flowered earlier. It may be possible to get seed from off the town trees.

Tuan
February 27th. Via Bagan Kecchil to Kubang Ulu where I examined the forest reserve, and then via Tasek Gelugor to the Malakoff estate and so back to Bagan tuan kecchil.

At Permatang Pauh I found coconuts damaged by Brachartona but no caterpillars left. Stodthart of the Malakoff estate stated that the pest had suddenly disappeared in August;

and that five broods of it follow one another always. He is of opinion that possibly a fungus kills it.

The exotic trees which Curtis planted on the Kubang Ulu reserve were found with some difficulty as other trees had obscured them, and there was an undergrowth of 6-8 feet in height. Of the two Eucalypts there, one fruits and the other does not. It is evident that they and corresponding trees in the Waterfall gardens were planted at the same time. The same Eucalyptus fruits in both places. The growth of Swietenia Mahogani is as in the Waterfall Gardens: its branches low.

Stodhart grows three races of bitter casava.

He told me that in 1913 Malays rented land from him and grew large crops of Dioscorea esculenta, making a profit of \$60 per acre. They planted the tubers, and allowed the shoots to get up a little: then they threw a handful of earth on the top of the plant. No supports were used.

Stodhart's opinion is that the chinaman with the Sagittaria crops at Bukit Mertajam makes \$60 per acre also.

Opuntia monacantha was seen in Butterworth. Opuntia cochinelifera was seen in a single plant at Permatang Al. The Euphorbia which is in the Residency grounds at Malacca is at Kubang Ulu. There also Furcraea has been planted.

In the evening I sailed for Lumut.

February 28th~~th~~. botanised around Lumut.

~~XXXXXXXX~~ March 1st., the same and to the house of the Josselyns.

March 2nd. in the very early hours left Lumut and arrived at Bruas at about 7 a.m. and there stayed with W.S. Cookson. In the morning I went around the Dindings

Coconut estate, and in the afternoon through the village.

March 3rd. in the morning to the Sandycroft rubber estate; at midday about the Dindings coconut estate; and in the evening left again for Lumut.

The land at Pangkalen baharu is an interesting series of old sea beaches parallel to one another. These beaches are at least seven in number and are very sandy, while the hollows between are peaty. Some of the hollows are narrow and some are wide. The sand is full of cockle shells doubtless of the same age as the permatang; but in this some caution is necessary as the permatangs have served for village sites. The village of Pengkalen baharu is upon one of the permatangs and a few years ago those behind it were deep in forest. Tembusu was, says Cookson, as common tree upon them. Now the permatang whereon is the village, in those parts where it is not at all cultivated produces lallang and *Pteridium aquilinum* mixed.

The pink *Cosmea* is quite common as a weed around the village. Betle palms and coconut palms are common in the village; but there is little attempt at making gardens.

The road to Batu Hampar, i.e. towards Taiping, runs along one of the permatangs for a distance and then turning east passes through a swampy forest full of rattans, crosses another permatang, more swampy forest and reaches the base of small hills where Batu Hampar is.

In open pools in the swampy hollows *Nymphaea* and *Utricularia flexuosa* are found; and against the edge of the forest there is a lot of *Lasia*. *Neptunia* was seen.

March 4th. In Lumut and in the evening left for Penang. *Euphorbia Tirucalli* is in the District Officer's compound there and *Cassia auriculata*, both flowering.

One of the commonest of the weeds in Lumut is *Sebastiana Chamaelea*. An ochre-coloured *Ipomoea* is common. A little *Hedyotis* is common.

March 5th. After a day in Penang, left for Singapore. The angšana trees have gone bare, and the trees of Jacaranda mimosaeifolia rather bare.

March 6th. in Port Swettenham.

March 7th. reached Singapore, where the flowers of Grammatophyllum are in exactly the same condition as they were in the Dindings; but they flowered in July in Penang.

A VISIT to
MALACCA in order to
organise Locust-
destruction.

July 2nd. 1914, left Singapore by the night mail.

July 3rd. In Malacca, where a spell of wet weather has set in. Rice has only just been sown in Alor Gajah, the delay being due to the want of rain. The river is brim-full. The upturned flowers of Commersonia are injured by the rain: it carries at the same time half-ripe fruit. Clerodendron disparifolium and a red Ixora are in flower. Limnanthemum is in flower in the rice fields. Several grasses and sedges are in flower. In Malacca the flowers of the following were seen, - Euphorbia hirsuta, Scoparia dulcis, Boerhaavia, Eclipta alba, a little Barleria, an Alysicarpus.

On the hill in Malacca the trees of Poinciana regia appear stubbed, whereas the big Euphorbia is splendidly grown. Apis was upon the flowers of the former. Xylocopa is mating.

July 4th. In the shop of the chinese fresh-herb seller are Hydrocotyle asiatica, Mazus and Vandellia, Dentaria, Spermacoce, the big Lactuca which I have collected at Jassin, and a Jussiaea.

Locusts had found a Phaseolus in cultivation very much

to their liking and had eaten every leaf: they had nibbled at sugar cane leaves.

Through Machap and along the side of the Selandar forest, I observed a scarcity of flowers. The roadside on the forest edge is margined by *Gleichenia*, *Selaginella*, *Homalonema*, etc. *Dioscorea orbiculata* (no. 530) was observed and near Machap *D. pyriformis*. *Dioscorea esculenta* was seen in cultivation by a Tamil who said that he had brought the tubers from India, and *D. alata* by a Chinaman. The latter was on ridges without any support. *Dioscorea hispida* is not uncommon.

Some excellent pepper was seen near Machap under shade of rubber. Near Malacca is a moderate area of ginger.

July 5th. At the ginger patch just mentioned the Chinamen were in great excitement at the approach of locusts; but it did not appear that they would eat the ginger.. They were seen to eat the grasses and sedges growing as weeds in the trenches between the rows of ginger.

My route took me through Durian Tunggal, Jasin, to Nyalas. *Dioscorea hispida* was quite common in the Malay holdings everywhere, having been planted chiefly for use in the manufacture of gula malaka. *Psophocarpus tetragonolobus* and *Pachyrrhizus tuberosus* were seen in gardens, and also *Capsicum minimum*. *Dioscorea alata* was seen very sparingly.

Dioscorea pyriformis was found in the Nyalas valley. There the abundance of *Homalonema coeruleum* was striking. Its spathes open only at the tip, allowing the apex of the spadix just to protrude: after flowering they fill with water, and then close up and bend over almost to the ground.

July 6th. to Durian Tunggal, Jassin, back to Kesang with Morten, to Jassin again, to Merlimau, to Bukit Gadong, and returned to Jasin and from it to Malacca.

At Bukit Gadong is a tract of land which has been swampy and which is now drained by a long ditch. Here young

coconuts and hill padi have been attacked by the locusts

This tract has been progressively cultivated from the south side. Under the coconuts that are oldest often one gets a big patch of *Passiflora foetida*, otherwise lallang: under newer coconuts is hill rice: at the top of the ditch vegetables are being grown, chiefly *Ipomoea Batatas*. but *sesamum*, *Citrullus*, *Luffa* and *Momordica* were present; and *Dioscorea alata* was seen once.

In the black moist soil of this area *Dioscorea pyriformis* grows, and the place evidently suits it: one may say that in Malacca the neighbourhood of water is necessary for it. *Dioscorea hispida* was seen at the head of the area, and apparently wild as there are no Arengas in the neighbourhood and therefore no sugar industry. Moreover I observe that someone had uprooted two plants as not wanted.

The locusts have here eaten the hill rice as they eat lallang, i.e. they have attacked the upper part of the leaf and eaten a portion. The grass which the locusts like best is *Paspalum conjugatum*, and where they settle upon it, they leave no more than a stony patch. Sedges are somewhat eaten by them.

In the rich mukim of Sebatu, the mangosteen crops promise well and the durians are just ripe.

The fall of the Kesang stream is so small that it is badly impeded by stranded logs between Chinchin bridge and the coast.

Shorea appeared to be flowering in the Merlimau forest; but it was impossible to stop for collecting. *Cyrtosperma lasioides* was observed in this forest; and *Lasia* was seen at Bukit Gadong.

July 7th. to Kuala Linggi and back via Kampong Tengah and Lubok China, Sungei Siput, Brisu and Kampong Tengah again,

and thence to Alor Gajah and forward to Malacca. The search for locusts on this journey thus covered all the roads which meet at Kampong Tengah.

In this part of Malacca territory *Oncosperma* seems to be less rare than towards Jasin, where I have seen it nowhere than in Jasin village. There are several clumps of it north of Tanjong Kling and beyond Pangkalan Baharu and also near Lubok China bridge.

Out towards Kuala Linggi the Malays are reluctant to cultivate their sawahs. These sawahs are behind the raised beach whereon the houses are. The houses make a continuous village and the men fish. It appears that the sawah was essential to them once and is so no longer, as they live so much more by means of exchange. *Melaleuca* is invading the fields.. The condition persists along the whole mukim of Kuala Sungei Baharu except at either end where there is a hill behind the coast.



At Kuala Linggi rock come to the surface.

There is gambier in various parts of the Sungei Bahru estate. The only area of tapioca seen is a small one near Bukit Lintang; further plants were in gardens.

Dioscorea pyriformis is not uncommon upon the edge of the Sungei Siput forest. *D. hispida* was seen all over the country side. *D. alata* was not seen.

Pandanus leaf cutting is in progress; the torn margin is removed at the same time, and drying follows.

Dendrobium crumenatum was in flower abundantly everywhere.

The palm which holds most epiphytes is *Arenga*; and these are chiefly ferns of three species.

The expression "village shrubberies" very satisfactorily denotes a vegetative formation in Malacca, which has a wide extension but varies in different parts somewhat, and is strikingly shewn at the meagre end of its development about Jasin, or richest in variety of planted fruit trees about Durian Tunggal, Sungei Siput, etc.

Pomegranates are cultivated to a very small extent in Malacca. I saw a few fruiting trees in the direction of Machap.

Among the weeds in flower near Malacca are:-

Ipomoea with cream coloured flowers,
 Amaranthus spinosus,
 various Cyperaceae and grasses, but not many of the latter,
 lallang is in fruit in places,
 Melastoma malabathricum
 Nymphaea
 Ageratum,
 Asclepias curassavica,
 Mimosa pudica,
 Urena
 Eriocaulon
 Vandellia
 Spermacoce
 Eclipta alba,

also I have noticed as in flower, Arenga saccharifera
 Cocos nucifera, Areca, Melaleuca, Adenosma capitatum, Castanopsis
 Loranthus ? ampullaceus, Dendrobium crumenatum, Euphorbia hirta
 and the plants that have been collected.

July 8th. I made some observations on the plants in the herb-shops: they were Hydrocotyle asiatica, Euphorbia thymifolia, Vandellia, Lactuca, Physalis minima, Dentella, Elephantopus scaber.

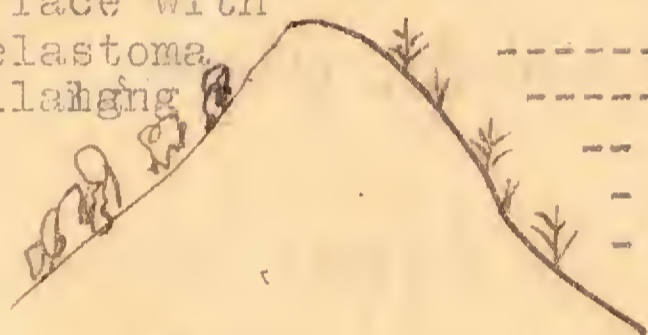
In vegetable stalls Ipomoea tops were offered, a little Amaranthus and Chinese cabbage.

I observe what a large quantity of cockles Malacca consumes.

I left Malacca in the afternoon for Tampin, and there went out of the village for a short distance along the road to Seremban. It soon gets into lallang in which stand rather well grown Morindas and *Peltophorum dasyrrhachis*.

July 9th. With Jack and Keene to Syer Kuning and over hills to the north of the station. The two faces of these hills differ

steep north face with
bushes of *Melastoma*
Pteris and lalang



more gentle south face
----- *Pteris* with lalang, ~~XX~~
----- lalang only
-- *Pteris* mixed with lalang
- lalang only
- *Pteris* mixed with lalang

There was a little *Ophioglossum* right upon the crest.
Gymnogramme calomelanos was present.

In the neighbourhood of Ayer Kuning station there are coconut palms and plantains. This is Malay cultivation. Northwards it is Chinese cultivation that has cleared the land, tapioca being grown. *Livistona* stands out of the belukar that exists in the hollows.

In the afternoon I went along the Seremban road to the 29th mile and there entered the lalang which is for the most part waist high and almost makes glades among the trees. There is a little fungus at the base of the lalang stems. *Melastoma malabathricum* is at home in these glades, constructing promontories from the neighbourhood of the trees that jut into the glades.

The fern *Gymnogramme calomelanos* is not uncommon in the lalang.

July 9th. To the Lebong siding and by paths to ~~Batang Malaka~~ ^{Kem}, calling on Stratton on the way.

Stratton says that locusts will not eat *Paspalum scrobiculatum* any more than horses. As he used to be District Officer at Alor Gajah before he took to rubber

25.

planting he is familiar with the country; and he tells me that none of the lallang wastes are older than 15 years and that most of them are about 7 years old.

Damage to rice in the nursery by locusts was reported on this day.

During my walk I tried to collect plants associated with lallang and obtained:-

Bonnaya brachiata only in open lallang

Oldenlandia dichotoma

Oldenlandia corymbosa only in very open lallang

Merremia hastata in very open lallang

Leucas zeylanica in open lallang

Vandellia crustacea in rather open lallang

Crotalaria sp. scarcely truly a lallang plant

Andropogon brevifolius in rather dense lallang in patches

Hedyotis with purple flowers in open lallang.

The last but one, i.e. the *Andropogon*, was not observed in the morning but near Tampin in the afternoon

July 11th. After a visit to Malacca from Gadek to Remuning, and back by Gadek to Tampin. Destruction of a small amount of rice by locusts was seen; and it was seen that they eat *Paspalum conjugatum* very freely. Sigar-cane leaves also had been eaten.

I paid another visit to the shop in Malacca selling fresh herbs, and record the following as offered:-

Euphorbia hirta, *Siegesbeckia orientalis*, *Artemisia*, *Oldenlandia corymbosa*, *Vernonia cinerea*, *Jussiaea*, *Aclipta alba*, *Justiciaendarussa*, a sedge with bright grass-like leaves *Cassia alata*, *Vandellia crustacea*, *Oxalis corniculata*, and *Typhonium trilobatum*.

At night I left Tampin for Singapore.

A second VISIT to
MALACCA in connection
with locusts. August 20th. left Singapore at night.

August 21st. After seeing the Resident, I went to Jasin, and Alor Gajah. Few flowers are out. The fruit season, which has been good is just over. Rice-sowing is progressing. It is reported that locusts have destroyed the hill-rice at Bukit Gadong. *Dioscorea hispida* is everywhere very evident. It was observed that coconuts were being cut from among rubber near Rembia.

While waiting to see the Resident, I observed that *Rivina* pollinates itself, the anthers coming into contact with the stigma when the flower is old.

There is a tree of *Zizyphus jujuba* on the Residency hill in Malacca.

August 22nd. I moved to Tampin. After reaching Tampin I went almost to Kendong by road, and returned along the railway line. The forest appeared very flowerless; *Mussaenda* was noticed, and *Mallotus*, but not much more. The pods of *Peltorhorum dasyrrhachis* are ripe.

The lallang is long everywhere along the Seremban road, except where it has been burned, and there it is flowering. It is interesting that burning should lead to flowers. *Mazus*, *Vandellia*, *Adenosma capitatum*, *Hedyotis* ? *pinifolia*, *Amotis*, *Cynodon dactylon* and a *Blumea* were observed to occur in it.

Xylocopa aestuans was observed upon the flowers of *Crotalaria striata* at 4.0 p.m.

August 23rd. to Tebong siding, and by various paths to Batang Malaka. The *Passiflora foetida* grown here looks rather unlike the more familiar plant. In the evening along the Kuala Pilah road for three miles. *Arenga* palms are common, but many stand dead. A *Ficus* with bright fruit ? *Ficus Griffithii*, is common upon them. Flowers are very scarce.

August 24th. to Kendong and by Bukit Payong back to Tampin. The lallang of Bukit Payong has been repeatedly burned since it took possession of the land which had been in tapioca. There are no weeds in it; but there are plentifully clumps of wild Musa, so much so as to be a feature. It cannot have been many years since the tapioca was abandoned and it looks as if the Musa had held on from the time when the forest was cleared through the tapioca growing. Big granite blocks encumber the hill.

The pods of *Peltophorum dasyrrhachis* commonly hold two seeds, but may contain up to six. Each seed has its own chamber, and is surrounded by a spongy material which possibly by holding water aids in germination. The seeds are very hard and very flat. The pods have their edges twisted to opposite sides, so that a section is

They hang vertically, and presumably fall whole. Seed is ripe everywhere now, and seems to hang long onto the trees.

At Kendong I found a *Clitoria ternatea* with all the petals vexillate, and I took seed.

In the afternoon I left for Kuala Lumpur, noting on the way the great beds of *Phragmites* at the sides of the rivers crossed, i.e. at Seremban and at Kajang.

One sees rice sawahs as far as Seremban, but scarcely beyond. The narrower are already planted; but not the broader, apparently in consequence of imperfect irrigation.

I found a little white caterpillar to devour the seed of *Peltophorum*.

August 25th. I proceeded to Penang. The difference between the climates of Singapore, and Perak, seem to be considerable; and, it is noticed that vegetables seem to do so much better in the neighbourhood of Ipoh than in Singapore. The season is late, and only a little rice can be seen west of Kuala Kangsar, and that is seed bed still.

so also is it in Krian.

I observed some indigo in Province Wellesley. There is quite a lot of Tapioca there. The pineapple cultivation continues but there are no fruits at present.

A.T. Bryant tells me that the cloves ~~XXXXXX~~ at Lumut were planted in his time there as Subdivisional officer, and the nutmegs were planted too but died out.

August 26th In the Waterfall Gardens two species of Grammatophyllum are in flower. A Furxraea is out. So far Widdringtonia Whitei is growing under glass. Md. Haniff has succeeded in crossing some of the Hibiscus plants. Impatiens mirabilis carries its last flowers. I am told the Attalea Cohune has once fruited, in Penang.

August 27th. Up the Government hill road almost to the top, to identify a plant observed by Bryant, which turned out to be Bauhinia. Of wild flowers upon the hill there are very few. The ^{globosa} green Elytranthe is flowering abundantly. Melastoma decemfidum and Rhodomyrtus are flowering sparingly. Adenanthera dumosa is in flower and a few inconspicuous bushes are out rarely. Rubus glomeratus is fairly well out high up the hill. Bromheadia is out. Habenaria lacertifera is scarcely at flowering. Two grasses were seen in flower. Glob a aurantiaca was flowering.

In the afternoon I went to Bukit Mertajam, where leaves of Sagittaria were being harvested for the feeding of pigs.

I observed the following to be on sale in the market of Bukit Mertajam town:- Cabbage, lettuce, brinjals the white chiefly, Vigna catiang, kankong, celery leaves, chillies, whole chili plants, ginger in quantity, colocasia in quantity, sugar cane, sayor manis, carambola, pachyrrhizus in quantity, lagenaria, Benincasa in plenty, Momordica, Luffa, fresh pomegranates, rambutans, pineapples, large round oranges, durian blanda, water naloys, chempedak, durians, a few only, mangosteens, and plantains.

August 28th. from Penang to Tampin. At Pondok Tanjong *Dioscorea bulbifera* was observed. This species is not uncommon in Penang, where for instance it grows in the Waterfall Gardens, in Macalister roads, and elsewhere.

August 29th. to Malacca, back to Gadek, to Kemuning and thence via Gadek to Tampin.

In the streets of Malacca very nice looking pineapples were being sold, also mangosteens, durians, *Baccaurea*, *Dioscorea alata*, *Pachyrhizus*, brinjals, cabbage, radishes, chillies, Vigna, plantains, And the herb shop was offering the following:- *Oldenlandia corymbosa*, *Peperomia reflexa*, *Eclipta alba*, *Elephantopus scaber*, *Hydrocotyle rotundifolia*, *Physalis minima*, *Vandellia crustacea*, *Euphorbia hypericifolia*, *Fimbristylis* the common weed of rice fields, *Pontederia*, *Cassia alata*, *Amarantus viridis*, *Blumea balsamifera*, *Justicia gendarussa*, *Plantago major*, and a common little composite.

Between Gadek and Kemuning *Cassia tora* is very common (is it *Tora* or the similar species?).

In the evening I left for Singapore.

COCONUT INSPECTIONS in SINGAPORE.

December 22nd., 1914., In the little bit of jungle at Changi *Daphniphyllum laurinum* is fruiting plentifully, but the fruits are not quite ripe yet..

There is *Neolitsea zeylanica* well in flower but not much otherwise. Under the coconuts at the Police station *Allmannia* was newly in flower; so it begins a season say in August.

Cleistanthus heterophyllus was seen in flower on the road to Changi.

Under the bark of a decaying palm trunk were found seedlings apparently those of the common blue *Commelina*. Could ants have carried the seeds thither?

December 23rd. Plants 251 to 263 were collected

along the extension of the Jurong road. From the 11th to the 13th. mile of this road the swamp forest contains a considerable amount of *Cyrtostachys* Lakka and of *Pandanus*.

Nepenthes ampullaria is particularly common along the road between the 10th and 11th mile.

January 27th., 1915. along the Jurong road. Only at the 11th. mile does *Lepironia mucronata* grow. From the 11th to the 12th mile that is in the swamp forest very little is at this season in flower. *Nepenthes* is common, but not in flower. On the other hand there is a fair supply of berries as the plants collected nos. 701 to 714 indicate. One *Glochidion* with almost white berries was collected, - no. 703. *Phyllanthus* was noted as having pink berries. *Medinilla Hasseltii* has the most beautiful berries.

Gynotroches was seen in flower and also a *Mussaenda*. Several *Cyperaceae* and a *Panicum* were observed to be in flower.

On the ground was a *Trichomanes* (*T. rigidum*) and an *Adiantum*.

Beyond the swamp where the ground rises is a great abundance of *Ptychoraphis singaporensis*, together with a *Homalonema*.

Rentis-cutting shows how quickly this forest will disappear.

February 1st. A long tramp across country from the outer end of Macpherson road to the Tampinis road about its 7th mile, and thence back to the neighbourhood of Bedok. The whole of this big area has developed without roads. Coconuts, rubber and pineapples were the first three crops, and after them tuba. A little indigo was observed, and some vegetable patches.

Xylocopa aestuans was seen visiting the flowers of *Stachytarpheta*.

February 5th. via the Yeo Chu Kang road to Trafalgar estate and Serangoon. In the mangrove swamp near Serangoon *Avicennia*, *Rhizophora*, and *Bruguiera* were in flower as if this is the flowering season of the mangroves. But *Lumnitzera* was not in flower.

In a shop at Paya Lebar *Apis indica* was occupied sucking the cut surface of a fruit of *durian blanda*.

Large areas of Pine apples have been planted up the Thomson road.

Upon coconut leaves on the Trafalgar estate were freshly matured moths of *Hidara Irava* (see Richards in Agric. Bull. F.M.S. no. 3, 1914.).

February 10th. to Ulu Berih, and by a path to the Sungei Bajau. Gambier cultivation has been given up and a big clearing made for pine apples.

At Ulu Berih is a little mangrove forest with an abundance of epiphytes on the trees. *Dendrobium serra* is common among them and also a similar *Dendrobium*. *Medinilla Hasseltii* was observed and in berry. *Homalonema Griffithii* was collected on a damp bank under trees, along with *Pentaphragma Ridleyi*. A little further on where the ground was drier *Euthemis leucocarpa* was found with *Pandanus parvus* and *Labisia pumila*.

A TOUR of inspection to PENANG and MALACCA. March 24th, 1915, I left Singapore by the S.S. Lama for Penang, the weather being unsettled.

March 25th. in Port Swettenham, whence I went to the forest that I had visited two years ago and I collected nos. 728 to 735. The forest is much changed. In the first place by the removal of the larger trees, the death of the *Oncospermas* has been brought about. *Pasiflora foetida* has found it possible to invade the forest in places; but the big saline fern *Acrostichum aureum* has

become one of the commonest of the plants. I saw no *Thrixspermum lilacinum*, which formerly had been common; but the little *Renanthera* was present in some amount along with *Vanda hookeriana* along with a *Saccolabium* like if not identical with no. 356. It was sent alive to Singapore. *Phreatia minutiflora* was obtained also. *Cymbidium finlaysonianum* and *Grammatophyllum* were observed but not collected.

March 26th. Penang was reached at the end of about six hours of rain, and in the afternoon, Government hill was climbed to the Crag hotel.

Spathodea campanulata is growing poorly at the Crag attaining only 20 ft., and with many dead branches. *Pterocarpus indicus* is just commencing to flower at the Crag.

Upon the ascent very little indeed was seen in flower. The scarlet *Bauhinia* was seen in one place; *Schima Noronhai* in several and an *Ixora* once. *Lantana* was seen near the Crag.

Retinodendron pallidum was found not far from the bottom of the hill.

Non orchids were in flower. *Bromheadia* further carried no fruit; but *Habenaria lacertifera* carried ripe capsules, its leaves being dead.

Penang has had a dry spell.

March 27th into Penang and back to the Crag. There are more flowers out than I surmised; for one does not see them so easily in ascending as in descending. An *Eugenia* is just coming into flower. A *Merremia* is in bud. A *Baccaurea* was found in flower. A *Xanthophyllum* was observed in flower in one individual. and also an *Elaeocarpus*.

The *Spathodea* trees in the Waterfall Gardens are only one degree better than those at the Crag.

Apis dorsata was seen on the previous day sucking moisture off wet soil.

March '28th. I botanised near the Crag. Upon the north side of the bungalow which we have taken is a bank of flowers, - Lantana red and white, Stachytarpheta, Spilanthes Acmella, Rubus paniculatus, Gynura rosea, Actinoschoenus filiformis, Breynia discigera, and Mussaenda. Synedrella is also there.

The scarlet Bauhinia is gorgeous upon the hill top. and also down at 1300ft.

Despite the bank of flowers near our bungalow, little is out upon the hill top.

March 29th. to Penang and back. Apparently the flowering season is on the increase; for instance, I find two Eugenias out, one on the hillside, and the other in the Waterfall Gardens. I collected several plants upon the way down. . Two Flowers of Bromheadia were seen out at 1400ft., and when I returned in the evening their flowers had closed.

On the flowers of Pterocarpus indicus in the Waterfall Gardens, Apis dorsata is exceedingly diligent.

March 30th. botanised in the neighbourhood of the Crag. The hollow to the north of the hotel is quite good ground. One descends into it past the oil-engine which supplies water to the hotel, and passes through Adinandra scrub with Gleichenia and Daemonorhops and a little Dipteris, into forest. The plants collected are nos. 741 and forwards. Rain came on.

In the morning Apis dorsata had been very busy upon the flowers of Pterocarpus indicus at the Crag.

Schima is quite a common tree about the hillsides and is full of flower. A Dichopsis or something similar is likewise in flower. Millettia atropurpurea is a third tree in flower; and a Quercus or Castanopsis is a fourth.

Of small trees in flower there is a common

Mallotus and a something like an Albizzia, probably a Pithecolobium.

There are young shoots of Dioscorea glabra and D. orbiculata all over the hillsides, but no signs of flowers.

March 31st to the Waterfall Gardens, and remained in Penang. Brunfelsia is magnificently in flower both at the Residency and in the Waterfall Gardens. The Bougainvillaeas planted into the Residency hedge are getting hold.

The long dry weather of this year seems to have had a considerable effect upon flowering, so that Cassia fistula is doing so well, and Bauhinia candia also, and in the Waterfall Gardens Randia is white over.

April 1st. After a day in Penang, I returned to the Crag hotel.

April 2nd. about the hill top. Bromheadia flowers open before 8.30 a.m.. There is plenty of Cassia mimosoides near the top of the hill, and one plant of it was seen in flower. Bidens was in flower there and Isotoma commonly.

Someone has planted a Hevea near to Richmond where it seems to be growing satisfactorily.

Later in the day I went into the hollow north of the Crag. It is place of the most luxuriant vegetation there are for instance four or five species of orchids, but none of them in flower. A big Liparis is upon the rocks. two species of Podochilus occur upon this branches near the ground: several Bulbophyllums are present: a purplish ground-orchid is upon the rocks.

Of typical delicate shade-vegetation (not cryptogams) are Argostemma Hookeri, Argostemma elatostema, Sonerila paradoxa; and Argostemma elatostema is sometimes upon banks where the direct sunlight received is small. These

plants have leaves which lie horizontal, so as to catch the maximum amount of light. It is otherwise with *Labisia pumila* and no. 751, which have leaves upright at the base curling over from the middle. *Freycinetia* leaves do much the same; and a *Freycinetia* is present in the hollow.

Two or three filmy ferns occur and a lot of mosses. But fruiting mosses are rare. Palms are plentiful, particularly so. It is interesting that tough leaved palms should abound in such hollows.

There is a *Strobilanthes* among the rocks, but not in flower. Several *Cesnerads* occur. The *Oncosperma* palms seem to be absent.

It is to be noted that coconuts are growing and bearing right at the top of the hill.

One plant of the common *Clerodendron* has been seen in flower: most of them bear the black fruits. The magenta *Osbeckia* and ? *Rhodomyrtus* are sparingly in flower. There is a light pink *Ipomoea* in flower freely upon the hill.

Down in the hollow under the Crag is an abundance of *Dacrydium*-seedlings about 18 inches high. It appears as if they cannot persist there for why if so are there no large trees. In that case the seeds have been washed down from the neighbourhood of the houses upon the hill.

In the Bel Retiro garden the roses want pruning, and are not always judiciously planted. In pots are red *Pelargonium zonale*, *Browallia*, two or three *Begonias*, a lot of *Impatiens Sultani*, *Hippeastrums*, an orange lily and a little *Aster*.

The *Bromheadia* flowers which were open at 8.30 a.m. were closing at 5 p.m..

April 3rd. In the morning upon Government hill, in the afternoon to Western hill and in the evening about the rocks on the north of the Crag hotel. On this sunny afternoon

the flower of *Argostemma Hookeri* and *Sonerila paradoxa* were open; but no insects were seen to visit them. The beautiful blue *Xylocopa coerulea* was seen towards evening on the flowers of *Adinandra dumosa*.

Dipteris is very abundant about the top of Western hill where it has been cleared that the beacon may be clearly visible. A large proportion of the trees upon the hill are *Dacrydiums*. *Agathis* exists in some quantity near Tiger hill.

In the hollow under the Crag I got *Cypripedium barbatum*.

An inflorescence of *Stylocoryna mollis* brought in to the house from the direction of Western hill, in the evening became very fragrant with the scent of Hyacinths.

April 4th. at the Crag from 8 a.m. upon the flowers of *Pterocarpus indicus* *Apis dorsata* was very busy.

Dioscorea orbiculata occurs upon the top of Western hill.

In the evening again I saw *Xylocopa coerulea* upon flowers of *Adinandra dumosa*, but I was not able to watch it close enough to see that it was sucking honey. In the afternoon after rain, *Apis dorsata* deserted the *Pterocarpus* flowers.

April 5th. I left the Crag for Penang. Upon the descent of the hill I noticed additions to the species in flower and it seems that a flowering season is indeed commencing.

April 6th. from Penang to Tampin. There is a little rice still out in Krian.

Nymphaeas are in flower.

April 7th. To Malacca and out to Selandar. Cowley-Brown has ascertained that the Malays curry the locusts.

A flowering season seems to be in . The rubber is

in new leaf and flowering. There is a *Mallotus* in flower *Nymphaea* was seen, and *Thottea grandiflora* (at the 13th. mile Jasin road) and *Chasalia curviflora* (Selandar) and *Cyrtosperma lasioides* (Jasin).

April 8th. to Alor Gajah, back to Gadek and through Kamuning to Tampin. *Melastoma malabathricum* and *Daphniphyllum laurinum* bear flowers, and likewise the common *Mallotus*. A few trees of *Peltophorum* and *Morinda* carry flowers. By Alor Gajah station *Phyllanthus* is in flower, *Antidesma*, and *Strophanthus dichotomus* and the Durian.

April 9th. to the Tangga Batu estate to look at Hevea trees, which bleed. There are quite a number in different parts of the estate, which bleed one drop at a time. Later on sectioning these trees, it seemed possible that the bleeding had origin in lightning discharge; but this was not proved. Tangga Batu is exposed to strong winds.

Floods are out about Durian Tunggal on the sedgey sawah. Between that place and Malacca, not a little rice is still uncut, much of it yielding poorly.

In the evening I occupied myself with the direction of flowers. *Canthium parvifolium* and no. 833 face upwards. *Gonocaryum longeracemosum*, *Globba panicoides*, and *Didymocarpus platypus* face horizontally. *Xylopia ferruginea*, *Eugenia lineata*, *Palaquium clarkeanum*, *Uvaria purpurea*, *Litsea myristicaefolia*, *Boschia Griffithiana*, and *Elaeocarpus stipularis* face downwards. I expect that a census would demonstrate a great preponderance of downwardly directed flowers. An approaching thunderstorm cut short my observations.

April 10th. I left Tampin for Kuala Lumpur. In the Agricultural Experimental ground I noticed how irregularly the Camphor trees have grown. From Kuala Lumpur I went to Port Swettenham. There at sundown I walked along the Klang

road, and noted:-

Vernonia cinerea, every floret sets seed, and there are about 20 to a head.

Eclipta alba, every floret sets seed whether hermaphrodite or female.

Ageratum, every floret seems to set seed. The stigmas are thus

Vernonia sp. apparently all the flowers are hermaphrodite, and the stigmas diverge very little.

Scyphyphora hydrophyllacea. Upon each head are 1-4 male flowers in the centre of a number of female flowers. The pollen seems to be swept out in the morning. At 5.30 p.m. I saw a wasp persistently sucking honey on the heads. It was of the size of *Vespa germanica*. The plant smells very strongly like *Inula*.

Wedelia-like plant. There are 5-6 female florets with rays, and about 20 hermaphrodite flowers which seem to set fruit. The stigmas ultimately become very strongly recurved.

In the evening all the flowers of *Mimosa pudica* of the day had withered.

About ten different grasses were seen in flower. The anthers of *Cynodon Dactylon* were very conspicuously hanging out. I think that two sedges were seen in flower. *Pennisetum* was abundantly out, its flowers scentless. *Amarantus spinosus* and *Alternanthera sessilis* had open flowers. *Cardiospermum helicacabum* was in flower upon the roadside.

The flowers of *Ipomoea* had all withered.

April 11th. I went into the forest that I had twice visited. Of flowers open in it there were few. Two mangroves were in flower, one a *Rhizophora* and the other with much smaller flowers.

The flowers of *Mimosa pudica* open sometimes during the night, the whole head at once.

The size of a fruit of *Carapa* upon a plant only 1

ten feet high seemed remarkable.

I found a moss close to the ground upon the knee-roots of trees. *Aerostichum aureum* is very common.

Soon after noon many of the flowers of *Mimosa pudica* faded.

I left Port Swettenham in the S.S. "Lama" towards evening.

A BOTANISING upon

PULAU TINGGI and

PULAU TIUMAN. June 15th., 1915 I left Singapore with

H.C. Robinson and V. Knight in the Fisheries launch "Shark".

There is described a visit to Pulau Tinggi in the Journal of the Indian Archipelago vol. 5, p. 140, by Thomson.

June 16th. We arrived off Pulau Tinggi at a little after noon. There was rain about; but the period before our visit had on P. Tinggi been dry. We got the use of a house in the village close to the sea.

The village lies along a sandy beach with coral rock under it at no depth, so that graves have to be built up. Just behind the village a little stream has removed the top soil and exposed the coral.

This little stream I crossed and reached the base of the hill through a coconut plantation.

In part of the village *Thourea* is the ruling grass and in part *Centotheca lappacea*. The village is shaded by coconuts and with them are one or two *Casuarinas*.

Nephrolepis is common everywhere, especially behind the village where it rules, and makes a bed about four feet deep. There is just a little *Pteridium aquilinum* with it. among the rather newly planted coconuts.

In the short grass of the village here and there are *Amaryllis* plants without flowers, a *Solanum* with bright red berries, *Bryophyllum calycinum*, and *Kalanchoe laciniata*.

The whole population of the island, the villagers say, is 150. They make copra, and get what they require

from the world outside by the conversion of it into money. There is no cultivation round the coconut palms; none except the digging up for new plantings.

Dendrobium crumenatum happens to be in flower in the village and with it on the trees is a *Cymbidium*, *Asplenium Nidus* and *Drymoglossum plicoselloides*. The *Cymbidium* was in fruit.

Cassytha is very common in the cleared land, and so is *Stemona Curtisii*. *Entada scandens*, *Morinda citrifolia*, *Adenanthura pavonina* occur among the trees. *Podocarpus polystachyus* and *Guettarda speciosa* are common with them. Several other plants were collected.

lallang occurs at the hill-foot.

Cycas Rumphii is plentiful

Solanum nigrum and *Solanum verbascifolium* are present.

In a clearing the Sweet potato and *Arachis* have been planted, the latter appearing unlikely to thrive.

Eastwards of the village is a headland with vigorous lallang on it, planted and neglected coconuts and a few pine apples.

June 17th. The morning was given to an examination of the hill at the back of the clearing, in the course of which I crossed to a stream, then round a hill-slope down to the shore, back along it until two streams were crossed, and then to camp again over the hill behind.

There is no *Cycas* in the forest but an abundance of *Orania macroclados*. Among the big trees overhead are *Alstonias* some being very fine individuals. Along with the *Orania* was *Xaryota mitis*, *Oncosperma* and two or three rattans. But rattans are not the commonest climbers in the jungle: *Menisperms* such as *Fibraurea chloroleuca* are perhaps commoner. In one place *Dioscorea laurifolia* was seen.

The ground in the high forest carries very little. But a *Homalonema* is not uncommon.

After I had approached near to the shore, *Clinogyne*

dichotoma was found in some abundance. Other members of the Scitamineae were rare, but two were found in flower or in fruit, namely *Alpinia galanga* upon a clearing in progress towards jungle and an *Amomum* apparently *A. lappaceum* (no. 882) in deep shade low down.

What I take to be a small *Piper* is common in shade.

Once a *Freycinetia* was seen.

Ardisia was not seen in the high forest; and *Stemona* was only seen after the coral margin of the land had been reached: there with it were *Nephrolepis* and *Bryophyllum*.

At upper tide limit more plants exhibit flowers than elsewhere. *Rubus* ~~XXXXXXXXXX~~ *angulosus*, *Grewia paniculata*, *Chrysophyllum Curtisii*? (no. 876, which I think is not this) *Uvaria hirsuta*, *Casearia* ? *leucolepis* (no. 871), *Hydnophytum formicarium*, the common *Carapa*, *Lumnitzera coccinea*, *Bruguiera gymnorhiza* and *Rhizophora mucronata* were observed. To no. 871 butterflies were going.

Cultivation here is a poor ~~XXXX~~ process, - a burning off of the vegetation and a sowing of coconuts among the boulders along with tapioca. . No subsequent weeding seems to occur. A watch is kept upon the crop, while the weeds grow up into a dense tangle which is uncomfortable to penetrate.

Circuligo is frequent in the shade. *Androbium leonis* was near near to the shore.

In the forest *Erytroxylon birmanicum* occurs; and a big durian was met with. I was told that rambutans exist in it.

Cymbidium finlaysonianum is in flower near the village. *Pongamia* occurs on the coast. *Eleusine indica* exists.

It is said that Pulau Tinggi once had a larger population; and that it has been reduced of recent years.

In the afternoon I went by boat along the coast, and landed at a point north of the furthest reached in the morning, where there is a sandy beach with coconuts and a little tapioca. Here a black sugar-cane was seen and *Averrhoa Bilimbi*.

Pandanus fascicularis and *Afzelia bijuga* are upon the sea front.

At the back of the shore where the hills rise, are big trees of *Alstonia* and *Shorea ? materialis* (no 888). Another big tree was collected being *Sindora intermedia*; it occurred close to the sea front by a little promontory.

Running down the sand, along with *Thouarea* was *Ipomoea biloba*, *Canavalia* and *Ipomoea* no 889,

Among the coconuts behind the sand ~~XXXX~~ was much *Neprolepis*. As epiphytes occurred *Hoya* *Asplenium* *Nidus* and *Polypodium* *Heracleum*.

June 18th. I made an attempt to reach the big hill of the island and started off with a guide, who unfortunately was bitten by a python on the knee after we had but a small distance. This necessitated a return and a search for another guide. The second guide did not take me further than a hill top very far short of Bukit besar. We reached a slope towards the east, below which the guide said lay a big bay with coconuts. The steepest part of this slope carried a patch of the bamboo no. 909. The highest part of the hill was the most covered by palms, *Orania macroclados* being the commonest, but with it was a sprinkling of the "langkat palm" and an abundance of *Plectocomia* no 865. and another ratten not now in flower. In some spots the palms are so numerous that 50 out of every 100 trunks would be theirs; elsewhere there might be 25 out of every hundred.

A path was recognisable up to the bamboos. It passed through scrub containing much *Parastrebus ilicifolia* and forward to two large durian trees, round which a small

space had been cleared by felling rivals. Then it passed on to a solitary *Parkia* which is cared for in the same way; and after that it fell slightly to the bamboos and disappeared. The use of these three economic trees cause the maintenance of the path.

We descended irregularly falling gradually to a dry stream, and coming out immediately north of our camp.

Only over the last part of the descent was *Parastrebus* observed, and there never in the sun, but always in shade: and this is interesting on account of the harshness of its leaves. With it *Tacca palmata* occurred in plenty; but it was not observed further away.

Oncosperma Tigillaria is not uncommon in the forest that was visited. The "langkat" was seen but once in fruit; then with big bunches hanging under the leaves. *Orania macroclados* was nowhere seen in fruit. In stature and foliage these two resemble one another much, but the trunk easily distinguishes them.

Nipa is found just at the foot of the hill.

Urena lobata occurs sparingly on the low ground, with *Eplismenus compositus* and *Justiciaendarussa*.

Curculigo orchioides is common upon the hill side. There a *Pandanus* was seen which is not the *P. fascicularis* of the shore-line.

Mallotus alba is common enough, and a big leaved *Macaranga* occurs. No *Elatostema* has been seen as yet.

Caesalpinia Sappan can be found in the island.

A rambutan tree exists behind the village.

I have not seen a *Thunbergia* as yet. *Scaevola Koenigii* was seen yesterday; fruits of *Abrus* were seen today. *Sida carpinifolia* occurs only upon the flat of the village. *Mimosa pudica* and *Stachytarpheta* seem to be absent. No *Crotalarias* have been seen as yet; No *Commelynaceae*: no *tembusus*; no *bintangor*.

Heritiera occurs. *Frangipanni* is cultivated.

There are no pigs upon the island, and no tigers. The absence of tigers may be a consequence of the absence of pigs.

Rain came on in the evening, and much wind with it, blowing all night, and the rain continuing sulkily until morning.

June 19th.. A result of the wind is a line of leaves of the sea-plants nos 899 and 900 along the beach: they have been torn from their anchorages on the coral flat which extends from the shore, and where they associate with seaweeds, as no 924.

Fulau Tinggi shows perhaps the slightest elevation so that the village divides the coral bench into two a part which is still submerged by the tide, and a part behind the village which has got a thin coating of soil.

Setting out at 8.30 I made an attempt to get further in the direction of yesterday's expedition; but there fell a sulky rain all the time. I climbed almost to the very top of the hill immediately behind our camp and then came down a steep face to the stream north of the camp and along it home.

An undoubtedly marked feature of the forest passed through is the great abundance of *Orania macroclados* and "langkat". In places there is nothing else; in others a few big trees are seen to rise through the palms.

As we approached the crest, the hill face at the same time getting steeper, the vegetation took on greater variety. A great big *Uncaria* rambled high over the trees and there was what seemed to be a *Vitis* of considerable size. There was also a *Convolvulacea* which was in flower but the flowers could not be got.

Of big trees, *Dipterocarpus grandiflorus* was plentiful; in fact it seemed on this hill to be more abundant than the *Alstonia*. *Shorea* no 946 was another of the tall trees.

As soon as the descent was commenced we dropped at once into a growth of *Orania macroclados* and "langkat" and both were seen in fruit. But the fruit of the former is rare. Rattans were observed here to be moderately plentiful: here I got *Daemonorops didymophyllus* and I saw broken fruits of it also in another place. There is rattan called rotan buah here and a *Korthalsia* is to be found.

Of herbs under the trees there was little except aroids.

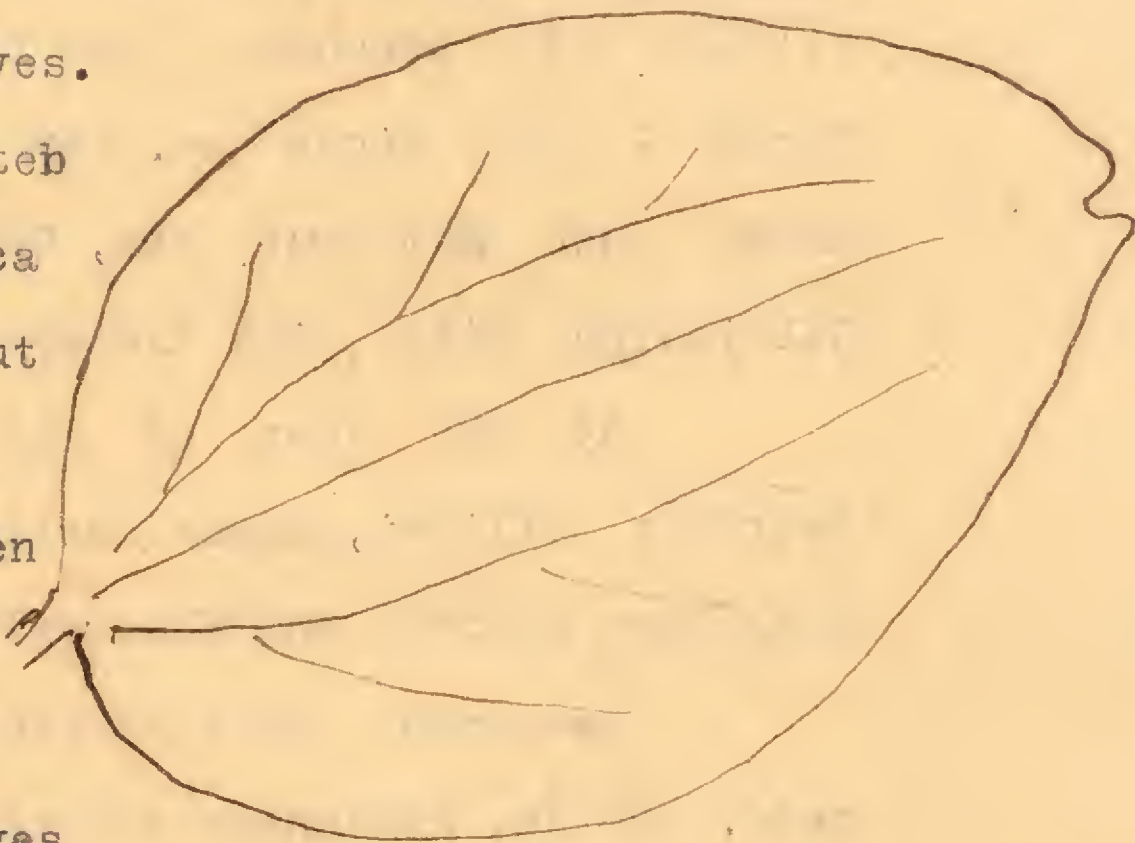
From the leaving of the old clearings to the time when we got back into them again, we saw neither a grass nor any *Cyperaceae*: moreover not a *Composite* invades the forest. There are few ferns.

Garcinia nervosa is by no means uncommon in the hill forest. *Alangium begoniaefolium* appears here and there. A *barringtonia* was found in two places. There is a *Bauhinia* with bifid leaves.

Tacca vespertilio was often seen, and once another *Tacca* with lanceolate leaves, but not in flower.

One small tree often is seen in the forest standing leafless: it is a *Sterculia* with big leaves that are lobed. But by no means are all the individuals of it leafless.

Aralidium pinnatifidum was seen once or twice.



The aroid no 917 is plentiful along with Homalonema. It occurs in two forms, large and small, perhaps only a consequence of situation.

Parkia was found at 700ft.

Upon reaching the stream, a set of small trees is met with having the characteristic of leaning out over the water, which trees it seems cannot live in high forest. Among these were a Ficus apparently *F. fistulosa*, *Eugenia pendens*, *Eugenia densiflora* and *Diospyros* no 943. I found the streamside much less rich than I had expected: ferns even were scanty along it; I collected three not seen before, but no one of them was abundant.

Dendrobium leonis was found on a rock over the stream along with two other orchids which carried no flowers.

Ficus alba is in the longcleared ground near the village

Upon the course of the stream we came as we descended upon a waterfall over a ledge of hard rock, looking like diorite and the same as the rock met with upon the other side of the island at the Cape beyond our beach. Above this shelf the boulders had lacked sharp angles.

Towards evening I went to the south-east end of the village and ascended the hill there for about 300 feet. There I got *Ficus* no. 949 in belukar, where it stood among much *Mallotus alba*, *Rubus angulosus* and the common *Callicarpa* with pink flowers and white berries.

At the foot of the hill was *Mangifera foetida*, *Averrhoa Bilimbi*, *Anona muricata* and just upon the hill *Mangifera indica* and *Flacourtia Cataphracta*.

Amarantus viridis (oneplant only) was seen in the sand. So far *Amarantus spinosus* has not been seen. *Justicia Gendarussa* was found; and another acanth, a little plant, occurs. *Terminalia Catappa* is among the houses.

Ricinus communis occurs.

There are a few cattle upon the island. I have seen two. Fowls are plentiful, but show no indication of running wild.

June 20th. On the sand is an abundance of *Euphorbia hirta*. By the stream behind is *Clerodendron inerme*, and *Excoecaria Agallocha*. *Selaginella* is very common among the *Nephrolepis*. *Kyllingia*, *Ruellia*, *Pouzolzia* and a *Phyllanthus* occur.

My guide of yesterday says that there is no *Nepenthes* on the island. If so this is very interesting.

Adenanthera pavonina occurs upon the island just above the sand-flat.

I measured three leaves of the big *Sterculia* which is leafless in places: a strikingly big leaf had an area of 2400 square cm.: a lesser one of 1500. It was seen in flower during the morning.

I climbed Bukit Treh to its summit. This meant heading northwards, crossing the point ~~XXXXXX~~ there,, crossing the sands of a small bay, and of the big bay with the mangroves in it, and then up hill. On the return I followed the Sungei Treh, and crossed the hill between it and our camp. The top of Bukit Besar was in cloud all morning.

At the commencement of the ascent *Bauhinia integrifolia* was obtained. It seems that there are three species of the genus here, the one of which a leaf has been drawn, this one and a third with leaves, -

Some clearing of land was in progress the removal of the *Orania* palms being the first step. Beyond the clearing we climbed through *Orania* and "langkap" with the usual sprinkling of larger trees. One of these was the curious no 955. It possessed a very stout trunk, and was a tall tree;

but from from 15 ft. the whole surface of the trunk was thickly beset with branches in a remarkably dense way.

Near the top of Bukit Treh the vegetation changes slightly. *Quercus cyrtorrhyncha* appeared and with it a very little *Gleichenia*. There were no openings in the forest; but the vegetation was more mixed, and probably owing to exposure it more frequently happens that a tree is overturned on the summit and in that way sunlight enough let in for the *Gleichenia*. *Alangium begoni-aeifolium* was present; and *Dipterocarpus grandifolius* seemed to be common. The big leaved *Garcinia nervosa* was there also.

A pink *Canavalia* was seen upon the sea-shore. The shore carries two species of mangrove as well as *Lumnitzera coccinea*. One of the two has a trunk arising from the sand without stilt roots, and the other which at the same time goes furthest out to sea, has stilt roots.

We descended the hill upon a very steep face. As soon as the top was left the *Orania* palms ~~XXXXX~~ reappeared; and rattans became less abundant. The herbs upon the slope were those seen before, - *Homalonema* and the other aroid with silvery leaves (surely *Schismatoglottis*). A fern was collected half way down; just at the foot of the steepest part *Pandanus Hullettii* was obtained.

It happened that we reached the Sungei Treh at a slightly higher place than on the previous occasion; but the vegetation was just as poor.

At the village is a very little *Andropogon acicularis*, a *Sida* with ovate leaves, *Passiflora foetida*, *Hoya nummularia*, *Achyranthes aspera*, *Capsicum*, *Aleurites moluccana*, *Tamarindus indica*, and *Hibiscus Rosa-sinensis*.

Cycas Rumphii grows upon the point at the north end of the village. But it carries no cones. Near to this point I saw *Xylocopa latipes* on the wing. Robinson says that he has seen it. Knight has caught *Apis dorsata*. *Melipona* nests are common.

I have found no Gesnerads yet.

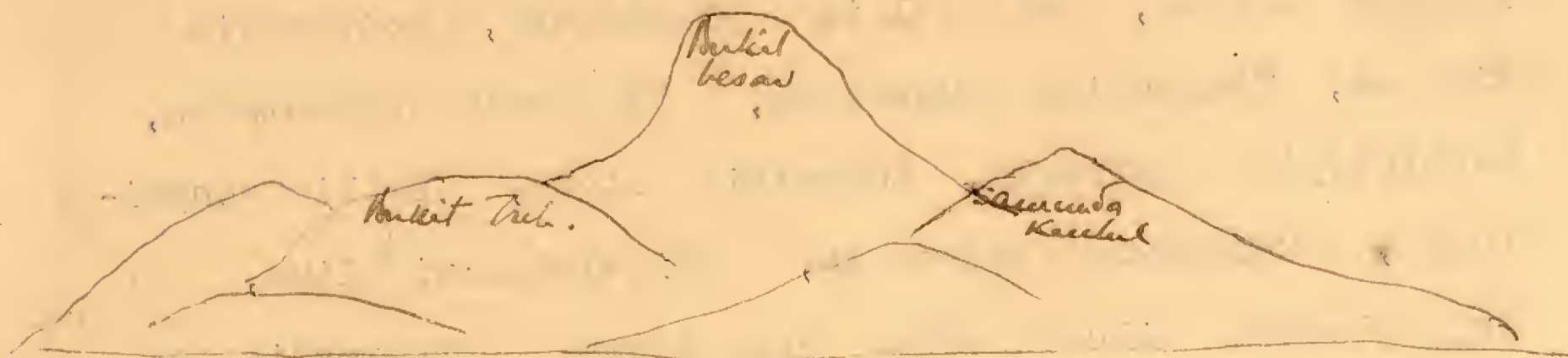
Towards evening upon the flat at the back of the village, I found *Flagellaria indica* and *Tristellateia Gnetum Gnemon*, and some other plants. It is to be remarked that *Pteridium aquilinum* has only been seen at this point.

Sagus exists sparingly upon the island.

Robinson who has been to Pulau Nango, brought back thence *Dianella ensifolia*.

July 21st. All night the wind rattled the coconut leaves upon the palms over our house, making a lot of noise, and rain fell at intervals. Early in the morning we left for Pulau Tioman, having to wade to the boat owing to the tide being low. There was a swell which caused us to make for Pulau Permangil, in order to avoid swamping, and then to turn towards Pulau Tioman. It was 4 p.m. before we arrived ashore in Joara bay.

From the boat I sketch P. Tinggi thus. Bukit Treh and Bukit Samunda kecil are my highest points.



June 21st. The beach in the southern part of Joara bay where we are in very different from that where we were on Pulau Tinggi. In the first place it is very much higher as a consequence of its exposure to the driving seas from the east, and it falls very steeply for the same reason. Its shelf is planted up with coconuts, half of the trees young and these with a number of other trees intermixed as follows:-

<i>Terminalia Catappa</i>	<i>Garcinia mangostana</i>
<i>Anacardium occidentale</i>	<i>Callicarpa</i> with white berries
<i>Melastoma malabathricum</i>	<i>Adenanthera pavonina</i>
<i>Scaevola Koenigii</i>	<i>Hoya diversifolia</i>
<i>Eugenia grandis</i>	<i>Mallotus</i> no. 965
XXXXXXXXXX <i>Glochidion</i>	<i>Caryota</i>
<i>laevigatum</i>	
<i>Citrus Aurantium</i>	<i>Justicia Gendarissa</i>
<i>Urena lobata</i>	<i>Dioscorea pyrifolia</i>
<i>Hibiscus tiliaceus</i>	<i>Sida cordifolia</i>
<i>Vitex trifolia</i>	<i>Adenosacme longifolia</i>
<i>Eugenia Jambos</i>	<i>Blumea balsamifera</i>
<i>Ficus</i>	<i>Ardisia littoralis</i>
<i>Pongamia glabra</i>	<i>Sophora tomentosa</i>
<i>Clerodendron inerme</i>	<i>Indigofera galegoides</i>

Running down the sand towards the sea is an abundance of the one leaved form of *Vitex trifolia* of *Sesuvium maritima*, *Ipomoea pes-caprae*, *Thuarea sarmentosa*, *Canavalia ensiformis* and locally *Ipomoea littoralis*.

Of herbs behind them we find, *Achyranthes aspera*, *Cassytha filiformis*, *Andropogon acicularis*, *Davallia*, *Isachne albens*, *Rottboellia glandulosa*, *Boerhaavia diffusa*, *Centrobium crumenatum*, *Polypodium phymatodes*, *Nephrolepis* sparingly, *Euphorbia atoto*, *Emilia sonchifolia*, *Commelyna attenuata*, *Erigeron linifolius*, *Drymoglossum piloselloides* upon trees, *Eragrostis* as collected upon P. Tinggi, *Cyperus diffusus*, *Mariscus albescens*, *Mariscus dregeanus*, *Blumea balsamifera*, *Panicum conjugatum* and *Centotheca lappacea*.